

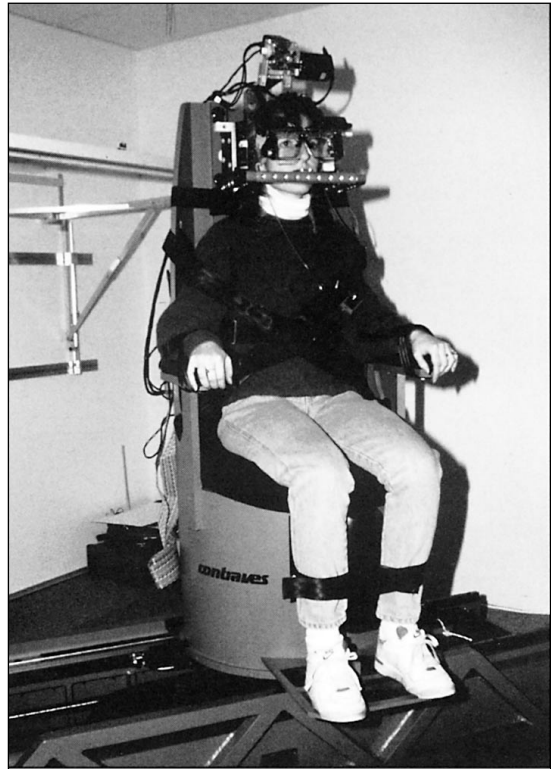
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# DEPARTMENT OF NEUROBIOLOGY AND ANATOMY

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The Department of Neurobiology and Anatomy is known for its excellence in research programs and its extensive teaching and leadership roles in the curricula of the medical and graduate schools. Over 25 faculty with primary and secondary appointments in the Department are actively engaged in research into the structure and function of the nervous system at a variety of levels. Areas of interest cover a broad spectrum, ranging from mechanisms underlying sensory and motor function, cell signaling and transmission, development and aging, neural responses to injury, neurobiology of disease, and others. Extensive state-of-the-art instrumentation and methodologies are available for the investigation of the nervous system. Close interactions with other departments and centers within the University that also maintain active interests in the nervous system ensure that the neural sciences will remain a leading area of research and teaching throughout the campus.

The Department is deeply committed to, and maintains extensive responsibilities in, the medical school curriculum through its leadership and participatory roles in key courses, including Human Structure and Function and Mind/Brain/Behavior. The Department's faculty are also central to the Interdepartmental Graduate Program in Neuroscience, which offers extensive training in research and teaching for graduate students and postdoctoral fellows with career interests in the neural sciences. The Department offers its own degree program in Neurobiology and Anatomy that is particularly well-suited to students in the University's M.D./Ph.D. program, as well as others interested in mechanisms underlying function and dysfunction of the nervous system. Additional scholarly ties exist with the Departments of Biomedical Engineering and Brain and Cognitive Sciences. The Department of Neurobiology and Anatomy, in collaboration with the Department of Neurology, offers a Postgraduate Medical Scientist Training Program in Medical Neurobiology. This unique program provides advanced training for individuals seeking a clinical residency in neurology integrated with a postdoctorate fellowship in neuroscience.



## Courses Offered by the Department of Neurobiology and Anatomy

### **491. M.S. Reading**

Credit—to be arranged  
Staff

### **495. M.S. Research**

Credit—to be arranged  
Staff

### **507. Molecular Neurobiology Seminar**

Credit—two hours  
Professor Coleman and staff

This survey course includes introductory lectures on molecular biology by the course instructors followed by detailed discussions on current research in the area of molecular neurobiology. Topics include development, gene regulation, neuron/glia interactions, and aging. Sessions consist of short overviews of the topic by the instructors followed by discussions led by seminar participants for selected current research articles.

### **521–522. Graduate Seminar**

Credit—one hour  
Associate Professor Ringo

Provides experience for graduate students in formulating and presenting an oral seminar based on the stu-

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dent's own research in an area of interest in the scientific literature. Skills involved in library searches, designing effective visual aids, and abstract writing culminate in the presentation of a seminar open to the medical school community.

### **530. Neural Basis of Learning, Memory, and Higher Function**

Credit—three hours

Prerequisite: NSC 512 or equivalent or permission of instructor

Associate Professor Ringo

This lecture/discussion course covers the physiologic bases of learning and memory. Topics include types of memory, evidence of memory in single-unit responses, computational approaches, habituation, conditioned reflexes, electrophysiologic indices, neuroanatomy of amnesia, interhemispheric relations, and clinical amnesia. Advanced undergraduates may elect this course with approval of the course director. Fall, odd-numbered years.

### **590. Lab Rotations in Neuroscience**

Credit—to be arranged

Staff

Students consult with the advisory committee to plan their rotations. Laboratory rotations are intended to familiarize students with a technique, to gain an appreciation of different scientific approaches to a problem, and to gain exposure to an area of research that eventually leads to a focused area of investigation.

### **591. Ph.D. Readings**

Credit—to be arranged

Staff

### **595. Ph.D. Research**

Credit—to be arranged

Staff

Opportunity is afforded qualified students to undertake research under the direction of members of the staff.

## **MEDICAL SCHOOL (INTERDEPARTMENTAL) COURSES**

### **HSF 110. Human Structure and Function**

Credit—to be determined

Assistant Professor Davis and staff

This integrated course in human structure and function encompasses disciplines of histology, embryology, gross anatomy, and physiology. The four disciplines are integrated in formal presentations centered around lectures, small group conferences, laboratory exercises, and problem-based learning sessions that approach human structure and function from a developmental, comparative, and clinical viewpoint. Regional histology, anatomy, and physiology, are integrated with the Introduction to Clinical Medicine course running concurrently

three afternoons per week in the new Double Helix Curriculum. Emphasis is placed on understanding human structure and function concepts in a clinical setting with a focus on self-directed learning and lifelong learning skills. Mid-September to late December. Required of all medical students.

### **MBB 205. Mind, Brain, and Behavior**

Credit—to be determined

Professor Józefowicz, Associate Professor O'Banion, and staff

This course, running for nine weeks beginning in mid-August, is a multidisciplinary introduction to the human nervous system that integrates both basic sciences and clinical disciplines. The basic sciences include neuroanatomy, neurophysiology, neuropathology, psychopathology, neuropharmacology, and psychopharmacology; the clinical disciplines include neurology and psychiatry. The host departments for this integrated course include Neurobiology and Anatomy, Neurology, Pathology, Pharmacology and Physiology, and Psychiatry. To achieve integration, both basic science and clinical faculty participate in lectures, laboratories, and problem-based learning cases. There are also seven Monday afternoon integration conferences on neurological and psychiatric disorders. The overall emphasis of the course is on the basic sciences underlying our understanding of these disorders. Particular emphasis is placed on clinically-based, problem-solving skills necessary for competent differential diagnosis.

### **512. Cellular Neuroscience**

Credit—five hours

Professor Shrager

This course presents a detailed view of cellular and molecular aspects of neuroscience, and is divided into four major sections. The first section covers basic molecular neuroscience and includes: identification and characterization of cellular components of the nervous system, elements of molecular biology in neuroscience, gene regulation and protein synthesis, chromosome structure, and genetic models of human disease. The second section deals with electrical signaling in neurons and covers: development of membrane potentials and signal propagation, molecular properties of ion channels and their role in neuronal signaling, synaptic receptors and channels, signal transduction, modulation of synapses and simple memory mechanisms, biochemical and pharmacological properties of synaptic receptors, neurotransmitter synthesis and transport, and excitatory and inhibitory amino acids. The third section is concerned with development of the nervous system and includes genesis of neurons and glia, neurotrophic factors, and neuronal migration. The final section covers: axonal pathfinding, plasticity and synaptic rearrangement, endocrine factors in neural development, and kindling and apoptosis in plasticity and development. The course includes lectures, conferences, problem-solving sessions, and presentations of the scientific literature. Fall.

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### 531. Integrative and Systems Neuroscience

Credit—six hours

Prerequisites: NSC 512, NSC 201/BCS 240 or equivalent introductory neuroscience course

Professor Pasternak and Associate Professor O'Neill

This course provides a critical overview of current knowledge of systems neuroscience. The topics include an overview of approaches and techniques, a comprehensive account of functional connectivity, transmitters, neurophysiology, and behavioral measures of sensory and motor systems, the basal ganglia, the limbic and hypothalamic systems, as well as memory, attention, and neurobiology of language. Students also participate in a gross brain dissection.

### 581. Teaching Tutorial in Human Structure and Function

Credit—to be determined

Professor Hansen and staff

This course is designed to provide an opportunity for students to acquire and develop skills in teaching human structure and function. The classical disciplines of embryology, histology, human gross anatomy, and physiology are typically encompassed in the course. Students are expected to attend all lectures and staff meetings, provide instruction in the laboratory, participate in small group discussion sessions dealing with clinical aspects of structure and function, and participate in writing and grading examinations. This elective is offered for both fourth-year medical students and advanced graduate students who have previously had anatomy, histology, and physiology courses. Mid-September–late December.

### 583. Teaching Tutorial in Histology

Credit—three hours

Associate Professor Stevens and staff

This experience is designed to provide an opportunity for students to acquire and develop skills in teaching and course management in histology. Students are expected to attend staff meetings, provide instruction in the laboratory, be responsible for small-group teaching, assist in preparing and grading examinations, and participate in staff-evaluation sessions. Although designed primarily for advanced graduate students in the Department of Neurobiology and Anatomy, other graduates may elect this experience with permission of the instructor. Early November–late January.

## Faculty of the Department of Neurobiology and Anatomy

**Gary D. Paige** . . . *Kilian J. and Caroline F. Schmitt Professor and Chair of Neurobiology and Anatomy*; Professor of Neurology, and Ophthalmology, and Center for Visual Science, and Brain and Cognitive Sciences. B.S. University of California (Irvine), 1974; Ph.D. Chicago, 1980; M.D. 1981; Clinical Internship, Michael Reese Hospital, Chicago; Clinical Residency, University of California (San Francisco), 1985; Assistant Professor of Otolaryngology, and Ophthalmology, and Neurology, and Neurobiology and Anatomy, Washington University, 1985–90; Associate Professor of Neurology, and Physiology, and Ophthalmology, and Otolaryngology, and the Center for Visual Science, University of Rochester; Chair of the Department of Neurobiology and Anatomy, 1998– .

### Professors

**Paul D. Coleman**, and Center for Aging and Developmental Biology. A.B. Tufts, 1948; Ph.D. Rochester, 1953.

**Deborah A. Cory-Slechta**, and Environmental Medicine and Pediatrics. B.S. Western Michigan, 1971; M.A. 1972; Ph.D. Minnesota, 1977.

**Robert W. Doty**, part-time. B.S. Chicago, 1948; M.S. 1949; Ph.D. 1950.

**Robert. D. Frisina**, and Surgery, and Biomedical Engineering. B.S. Hamilton, 1977; Ph.D., Syracuse, 1983.

**Suzanne N. Haber**. B.A. Kent State, 1968; Ph.D. Stanford, 1978.

**John T. Hansen**. B.A. Beloit, 1970; M.S. Creighton, 1972; Ph.D. Tulane, 1974.

**Robert J. Joynnt**, Emeritus, and *Neurology*. B.A. Westmar, 1949; M.D. Iowa, 1952; M.S. 1963; Ph.D. 1963; D.Sc. (Honorary) Westmar, 1964.

**Ernest J. Nordeen**, and *Brain and Cognitive Sciences*. B.S. Illinois State, 1977; Ph.D. University of California (Irvine), 1981.

**Kathy W. Nordeen**, and *Brain and Cognitive Sciences*. B.A. Lawrence, 1977; Ph.D. University of California (Irvine), 1982.

**Tatiana Pasternak**, and Brain and Cognitive Sciences, and Center for Visual Science. M.S. University of Warsaw, 1969; Ph.D. University of Copenhagen, 1977.

**Peter G. Shrager**, and Biochemistry and Biophysics, and Pharmacology and Physiology. B.S. Columbia, 1963; Ph.D. University of California (Berkeley), 1969.

**Garth J. Thomas**, Emeritus. B.A. Kansas State Teachers College, 1938; M.S. Kansas, 1940; M.A. Harvard, 1943; Ph.D. 1948.

### Associate Professors

**Charles J. Duffy**, and *Neurology*, and Ophthalmology, and Center for Visual Science, and Brain and Cognitive Sciences. A.B. Harvard, 1977; M.D., Ph.D. Johns Hopkins, 1984.

**Denise Figlewicz**, and *Neurology*. B.S. Loyola University of Chicago, 1974; Ph.D. 1979.

**M. Kerry O'Banion**, and *Neurology*. B.S. Illinois (Urbana), 1980; M.D., Ph.D. 1987.

**John A. Olschowka**. B.S. University of California (Davis), 1973; M.S. 1974; Ph.D. 1978.

**William E. O'Neill**, and Brain and Cognitive Sciences. B.S. Cornell, 1969; Ph.D. SUNY (Stony Brook), 1976.

**Diane T. Piekut**. B.S. Stonehill, 1968; M.S. Tufts, 1970; Ph.D. Boston, 1976.

**James L. Ringo**, and Center for Visual Science. B.S. Massachusetts Institute of Technology, 1973; Ph.D. Duke, 1979.

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**Marc Schieber**, and *Neurology* and Brain and Cognitive Sciences, and Center for Visual Science. A.B. Washington, 1974; M.D.-Ph.D. 1982.

**Suzanne Y. Stevens**, and Psychiatry. B.A. Oakland, 1968; M.S. Drexel, 1970; Ph.D. Indiana, 1981.

**Joseph P. Walton**, and Surgery. B.A. Florida, 1976; M.A. 1982; Ph.D. 1984.

#### **Research Associate Professor**

**Ronald W. Wood**, and *Obstetrics and Gynecology*. B.A. Grinnell, 1968; M.A. Rochester, 1975; Ph.D. 1977.

#### **Assistant Professors**

**David J. Calkins**, and *Ophthalmology*, and Center for Visual Science. B.S. University of Michigan, 1989; Ph.D. Mahoney Institute of Neurological Sciences, 1994.

**Barbara J. Davis**. B.S. Syracuse, 1973; Ph.D. SUNY (Upstate), 1982.

**Kevin A. Davis**, and Biomedical Engineering. B.S. Boston University, 1986; M.S. 1989; Ph.D. 1995.

**Edward G. Freedman**, and Center for Visual Science. Sc.B. Brown, 1986; Ph.D. University of Pennsylvania, 1996.

**Julie Fudge**, and *Psychiatry*. B.S. Colgate, 1980; M.D. Albert Einstein, 1989.

**Lin Gan**, and Center for Aging and Developmental Biology. B.S. Zhongshan (China), 1985; Ph.D. University of Texas (Houston), 1992.

**Greg T. Gdowski**, and Biomedical Engineering. B.S. Boston University, 1985; M.S. 1989; Ph.D. 1996.

**David R. Kornack**, and Center for Aging and Developmental Biology. Ph.D. Cornell, 1990.

**Lizabeth M. Romanski**, and Center for Visual Science. B.S. Rutgers, 1984; Ph.D. Cornell, 1992.

**Scott H. Seidman**, and Center for Visual Science and Biomedical Engineering. B.S. Johns Hopkins, 1987; M.S. Case Western Reserve, 1989; Ph.D. 1993.

#### **Research Assistant Professors**

**Martha Johnson Gdowski**. B.S. Gannon; Ph.D. Pennsylvania State, 1995.

**Voyko Kavcic**. Dipl. University of Ljubljana (Slovenia); Ph.D. North Texas, 1997.

**Betsy S. Phipps**, part-time. B.A. Wellesley, 1977; Ph.D. Tufts, 1981.

**Stanislaw Sobotka**. M.S. Technical University (Poland), 1977; Ph.D. Polish Academy of Sciences, 1981.

**Amandip Utal**. B.Sc. Punjab Agricultural University (India), 1982; M.Sc. 1984; Ph.D. University of Alberta (Canada), 1992.

**Jibin Yao**. M.D. Second Military Medical College (China), 1983; M.S. Georgetown, 1987; Ph.D. 1991.

#### **Senior Instructor**

**Patrice Spitalnik**, and *Pathology and Laboratory Medicine*. B.A. Skidmore, 1974; M.D. Chicago, 1978.

## DEPARTMENT OF NEUROLOGY

The Department of Neurology is recognized for excellence in research, teaching, and clinical care. The faculty includes neurologists and neuroscientists; additional practicing neurologists with clinical appointments teach medical students and residents in a private practice setting. The Department of Neurology encompasses the following units: General Neurology, Epilepsy, Movement and Inherited Neurologic Disorders, Molecular Medicine and Gene Therapy, Neuroimmunology, Neuromuscular Disease, Cognitive and Behavioral Neurology, and Child Neurology and Stroke. The Department also has major affiliations with several regional hospitals including Rochester General, Monroe Community, Highland, St. Mary's, and Canandaigua Veteran's Administration.

The Department has an extensive research program in the neurosciences and collaborates with various other departments and divisions within the University, including the Departments of Neurobiology and Anatomy, Brain and Cognitive Sciences, Neurosurgery, Ophthalmology, and Pharmacology and Physiology; and the Divisions of Neuroradiology and Neuropathology. Areas of particular strength include neuromuscular disorders, movement disorders, multiple sclerosis and other neuroimmunological disorders, Alzheimer's disease and other dementias, behavioral neurology, neuroendocrinology, neuropharmacology, stroke, and epilepsy. The Department includes the Director and other investigators in the Center for Aging and Development.

The Department of Neurology plays a major role in medical student education in years two and three of the medical school curriculum. The second-year Mind, Brain, and Behavior Course is a multidisciplinary introduction to the human nervous system that integrates both basic sciences and clinical disciplines. The basic sciences include neuroanatomy, neurophysiology, neuropathology, psychopathology, neuropharmacology, and psychopharmacology; the clinical disciplines include neurology and psychiatry. The host departments for this integrated course include Neurology, Neurobiology and Anatomy, Pathology, Pharmacology and Physiology, and Psychiatry. The objective of this course is to provide the medical student with a sufficient background in neurosciences, neuropathology, neuropharmacology, psychopathology and psychopharmacology to permit knowledgeable participation in the diagnosis and care of patients with neurological and psychiatric problems. Nine Problem-Based-Learning (PBL) cases are discussed in this course, and neurology chief residents serve as PBL tutors for these sessions.

Second-year students also spend four afternoons in the office of a community neurologist, as part of their second-year Ambulatory Clerkship Experience. At the end of their second year, students spend one week studying the peripheral nervous system and neuromuscular disorders during their eight-week, second-year seminar course.